STATE OF IDAHO
FISH AND GAME DEPARTMENT

John R. Woodworth, Director.

BIOLOGICAL SAMPLING OF PANTHER CREEK ABOVE AND BELOW THE INTRODUCTION OF MINING WASTES, 1967

by

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CONTENTS

TABLES

Number Page

FIGURES

FIGURES

Number Page

FOREWORD

In the summer of 1967, the Idaho Fish and Game Department conducted biological sampling in Panther Creek to determine the effects of mining wastes upon fish and fish food organisms. The data and analysis of the Fish and Game Department are presented in this report.

Some amount of mining activity has occurred in the Panther Creek drainage during the last 100 years. Until the last 20 years though, this mining activity has not been of sufficient magnitude to affect the fishery resource to any significant degree.

During the early 1900's, there were several small mining operations on Blackbird Creek, a small tributary of Panther Creek. According to the available records, however, none of these mines employed more than 40 or 50 men. In 1949 Colera Mining Company built a large mine and mill on Blackbird Creek to mine for cobalt. This venture was quite successful to the point of being the nation's largest source of cobalt in the mid-1950's. During this period, there were 450 men employed by the mine and they milled 1,000 tons of ore per day. The small community of Cobalt thrived as a booming mining town during this eight year period. In 1960, the price of cobalt declined to the point that the mine was forced to shut down. Machinery Center, Inc., of Salt Lake City bought the mine plant for disposal purposes during this time. Later when the copper price went up, they reopened the mine to recover the copper and gold from the ore.

In the spring of 1967 Machinery Center, Inc., made a lease-option agreement with Hannah Corporation who used the mine to extract copper and cobalt ore during 1967 as part of some intensive exploration and inventory studies. At this time the mill is shut down by the Hannah Corporation for major reconstruction work.

SUMMARY

Prior to the construction of the cobalt mine on Blackbird Creek, Panther Creek and its tributaries sustained a sizeable run of salmon and steelhead as well as a large population of resident trout. The salmon run may have been as large as 2,000 spawning fish. Since 1945, there have been several incidents recorded of fish dying in Panther Creek, some of which were directly connected with the release of waste materials from the Blackbird Mine. In 1957, the creek was closed to all salmon fishing. For the last five years, no salmon or steelhead redds have been seen or reported in Panther Creek. In spite of the protection salmon have disappeared from Panther Creek. The disappearance during the operation of the Blackbird Mine appears to be more than just coincidental. In the .summer of 1967, biological sampling work was done in Panther Creek to determine the effect of mine waste waters flowing in from the Blackbird Mine.

The use of electrical fish sampling gear shows that a much larger population of fish is found above Blackbird Creek than below it, indicating that materials coming in at Blackbird Creek are killing and/or driving fish out of this vicinity.

Sampling of aquatic insect populations above and below the mouth of Blackbird Creek also showed larger populations of organisms above Blackbird Creek than below, indicating that toxic materials are coming in from Blackbird Creek.

Eyed cutthroat eggs that were buried in Panther Creek above and below Blackbird creek did not show definite effects of pollution from Blackbird Creek. However, these eggs were buried for only seven days due to the rapidly receding water stage and may not have been exposed long enough to show any adverse effects.

Fifty rainbow fingerlings held in a live box placed in Panther creek just above Blackbird Creek exhibited only four percent mortality after three days exposure while a similar live box placed in Panther Creek just below the mouth of Blackbird Creek had 100 percent mortality for the same length of exposure. This test demonstrated that materials(s) toxic to fish and fish food organisms are entering Panther Creek from Blackbird Creek, apparently originating from the cobalt mine and/or the settling ponds on the West Fork of Blackbird Creek.

THE SAMPLING AREA

Panther Creek is a stream with an average discharge of 248 cubic feet per second that flows into the Salmon River 51 miles below Salmon City. It drains an area of 529 square miles that varies in elevation between 10,000 and 3,300 feet.

The Blackbird Mine is located about eight miles up Blackbird Creek and this stream drains into Panther Creek about 24 miles from the mouth (Figures 1-16). At this point, Blackbird Creek flows at an average discharge rate of about 5 cfs and Panther Creek flows at an average discharge rate of some 40 cfs. In this particular area the drainage is characterized by very steep slopes. These slopes are rocky and, in many areas, quite unstable.

The sampling stations were located in Panther Creek above and below the mouth of Blackbird Creek (Figure 1) . Station number one was located five miles above the mouth of Blackbird Creek, station two was located immediately above the mouth of Blackbird Creek, station three was about 100 yards below the mouth of Black-bird Creek, and station four was five miles below Blackbird Creek. Station five was on Blackbird Creek about 100 yards up from the mouth.

SAMPLING OF FISH POPULATIONS

The senior residents of Lemhi County tell us that Panther Creek had sizeable runs of salmon and steelhead *prior* to 1945. According to their stories, this stream could be compared to the Lemhi River in numbers of spawning salmon. If this was the case, then Panther Creek had a run of salmon spawning in its headwaters that may have numbered 2,000 fish or more.

According to records of the Idaho Fish and Game Department Conservation Officer in Salmon, there were significant fish kills in Panther Creek in March, April, and July of 1954 involving trout, whitefish, steelhead, and salmon. Each one of these kills was associated with the accidental or voluntary release of acid at the Blackbird Mine. Between 1954 and 1967, there are numerous reports of various amounts of black sediment in Blackbird and Panther Creeks.

Prior to 1954, we do not have any records of fish counts or salmon redd counts. No salmon redds (spawning nests) have been observed in Panther Creek since 1962.

On April 25, 1967, the fish population in Panther Creek was sampled by using a portable electric A.C. fish shocker (Figure 17). Four stations were sampled in Panther Creek and one in Blackbird

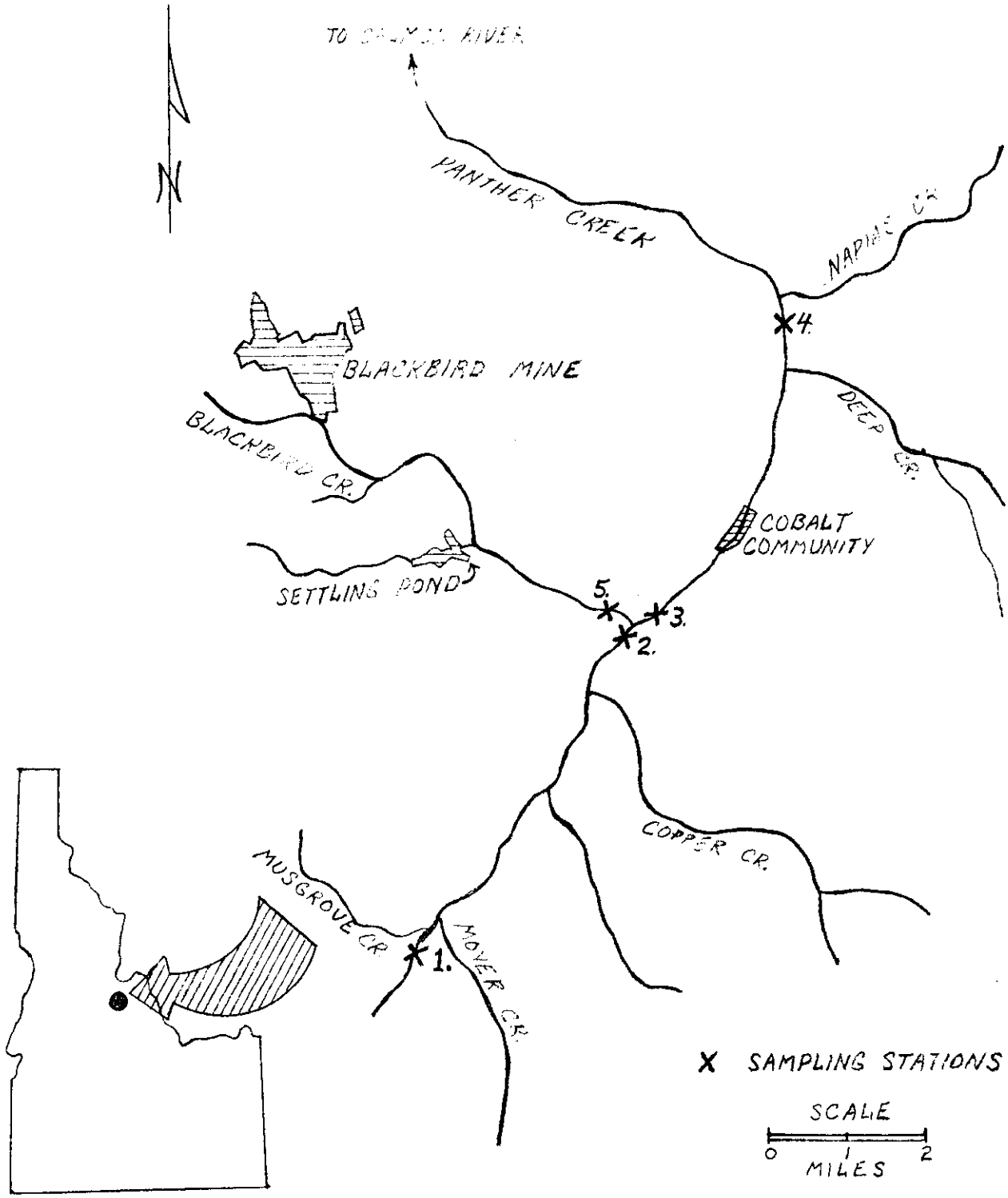

Figure 1 . Map of Blackbird Creek and Panther Creek, showing the location of the Blackbird Mine and the biological sampling stations in Blackbird Creek and Panther Creek.

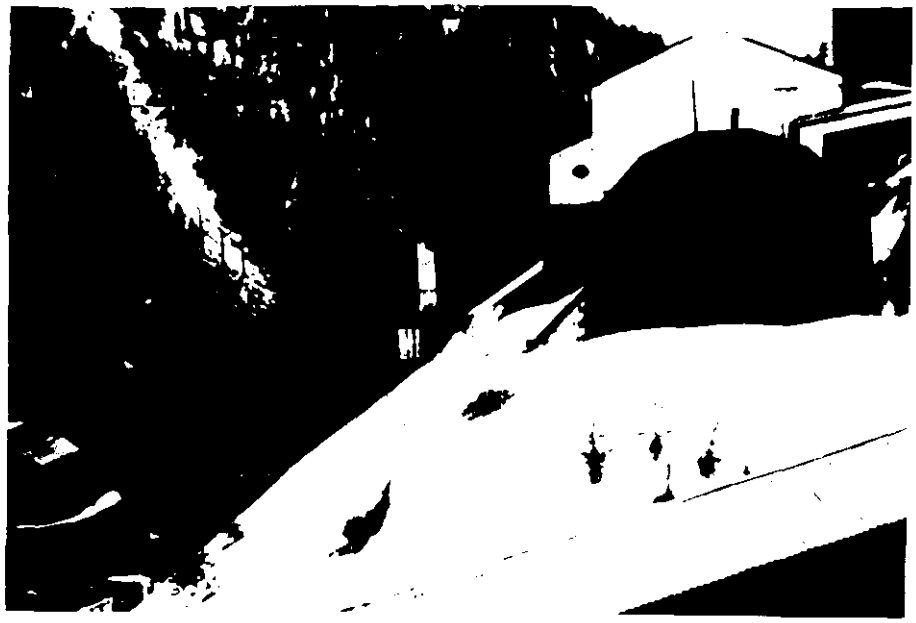

Figure 2. Blackbird Mine, looking east at the main mill building.

Figure 3. Blackbird Mine looking north at a mining tunnel entrance and ore conveyors.

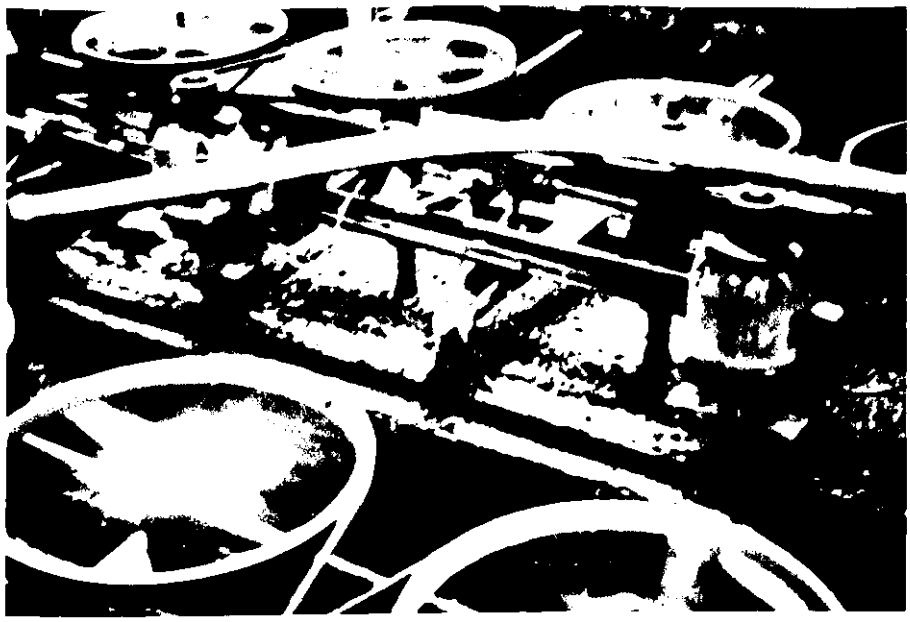

Figure 4. Agitators inside mill that are used in part of the flotation process to separate the cobalt and copper ore from the waste materials.

Figure 5. Waste materials coming from the mill are dumped into a pipeline going to the settling pond or are spilled directly into Blackbird Creek.

Figure 6. Much of the waste material going into the stream settles out onto the banks of Blackbird Creek as the stream flows away from the mill.

Figure 7. Sediment buildup is especially prevalent when freezing conditions occur along the stream.

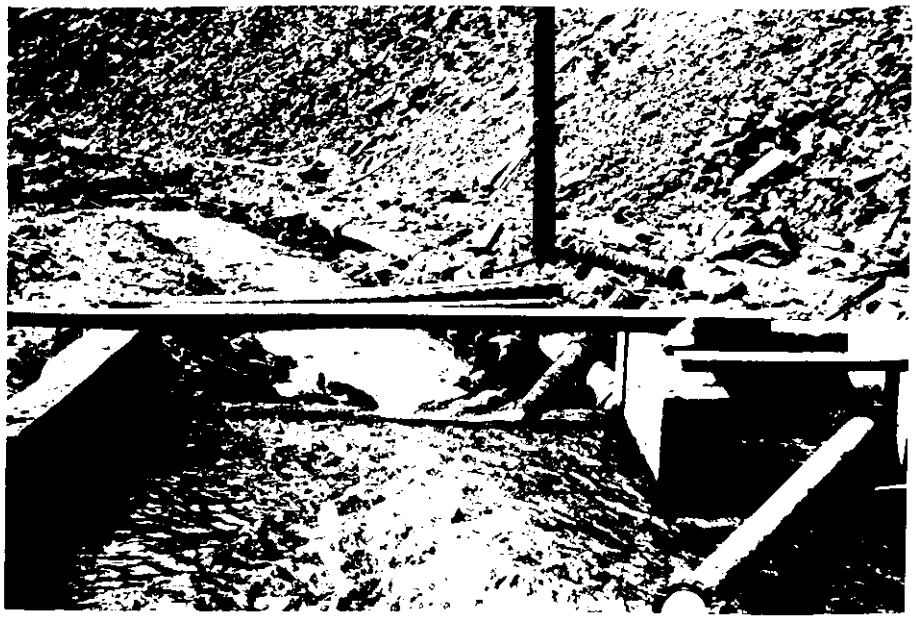

Figure 8, A small dam across Blackbird Creek is used to divert part of the mill effluent into a wooden pipe.

Figure 9. The wooden pipe is used to carry the effluent to the settling pond. The pipe is broken frequently by rock slides or freezing, causing the diverted effluent to flow back into Blackbird Creek.

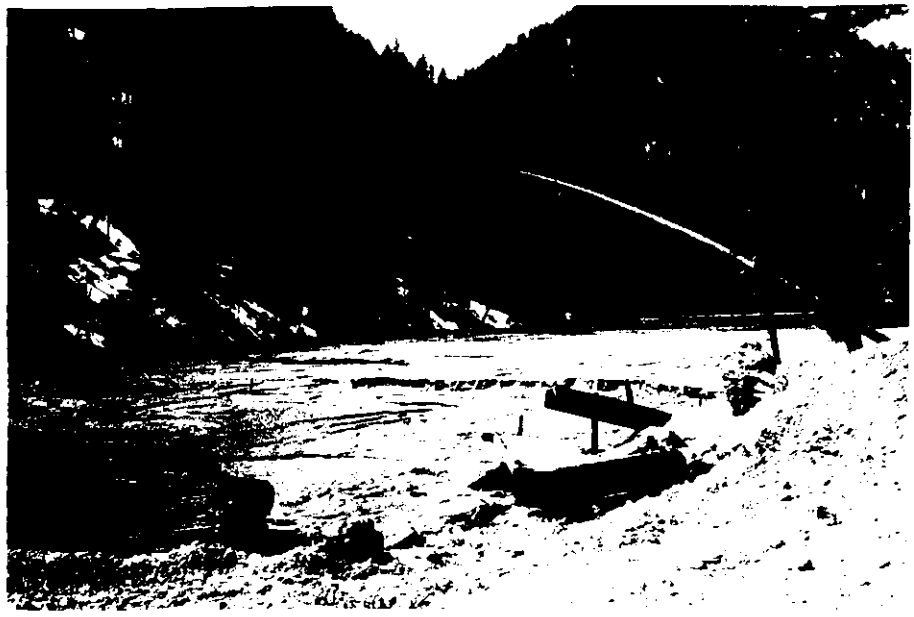

Figure 10. The wooden pipeline empties into this settling pond on the West Fork of Blackbird Creek,

Figure 11. This dam on the West Fork of Blackbird Creek retains the Blackbird Mine settling pond. The small object on the skyline of the dam is a man observing this structure.

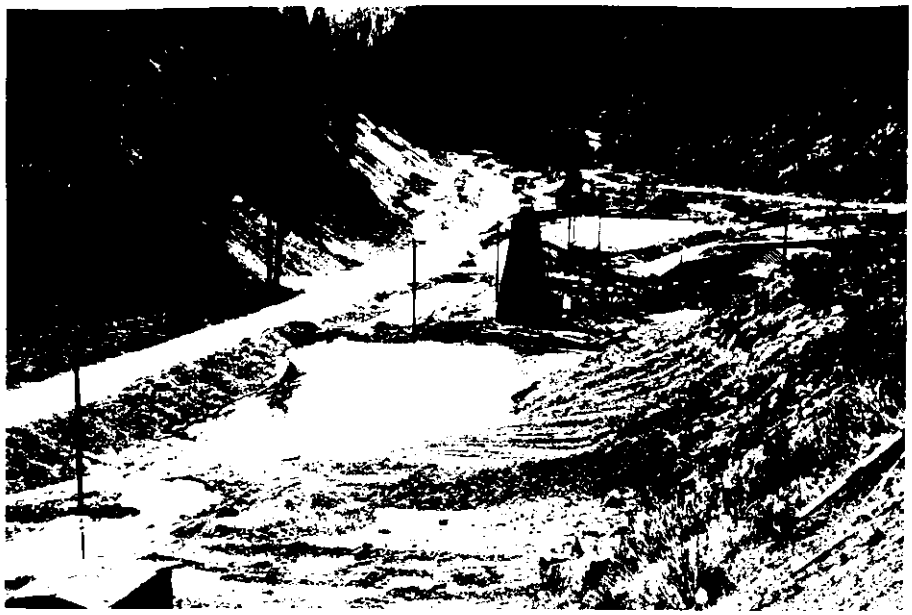

Figure 12. These settling ponds were located in Blackbird Creek at the mouth of the West Fork of Blackbird Creek. Their purpose was to catch waste that was spilled accidently into Blackbird Creek.

Figure 13. These small settling ponds in Blackbird Creek did not prevent the waste materials from flowing downstream. With high water each spring, the dikes would break and the impounded material would be washed down into Panther Creek.

Figure 14. Blackbird Creek is about 5 cfs in size where it flows into Panther Creek.

Figure 15. Panther Creek about 100 yards below the mouth of Blackbird Creek showing silt deposited on the bank that came from the Blackbird Mine.

Figure 16. Many meetings have been held involving the mining officials, the U. S. Forest Service, the Idaho Department of Public Health. and the Idaho Fish and Game Department to discuss the pollution problems involved with the waste from the mine and reduction mill.

Figure 17. Idaho Fish and Game Department employees are using an electrical fish shocker to collect fish from Panther. Creek. The fish are stunned briefly by the elecTrical current so they can be captured and identified.

Creek. In each case, 150 yards of stream were investigated to determine the number and species of fish present (Table 2).

At station one we found a total of 66 fish; at station two, 24 fish; at station three, no fish; at. station four, ; fish: and when we shocked a similar section of Blackbird Creek we could not find any aquatic life whatsoever.

Table 1. Summary of salmon redd counts in Panther. Creek, 1954-196[7].

Year	Number of redds
1954*	12
1955	25
1956	55
1957**	135
1958	115
1959***	-
1960****	-
1961	4
1962	10
1963	0
1964	0
1965	0
1966	0
1967	0

* 200 adult chinook killed by acid dumped into Blackbird Creek, ** Stream closed to salmon fishing.

*** Turbid water from Blackbird Creek prevented observations. **** Plaoer mining caused turbid water and prevented observations.

Table 2. Numbers and species of fish found in 150 yard stream sections in Panther Creek with an electrical fish shocker on April 20, 1967.

Station	Rb	EB	WF	Sculpin	Dace	Un	Total Fish
1	26	3	27	2	3	5	66
2	20	2	-	-	-	2	24
3	-	-	-	-	-	-	0
4	8	1	-	-	-	-	9
5	-	-	-	-	-	-	0

Rb - rainbow trout
EB - brook trout
WF - whitefish
Un - unidentified

SAMPLING OF AQUATIC INSECTS

Aquatic insects were sampled in Panther Creek for two basic reasons, First, they are more sensitive to pollutants than vertebrates and, therefore, can be used to indicate the presence of minute amounts of toxic materials in the stream., The second reason for sampling them is because of their importance to fishes as a food supply, The *major* part of a salmonids diet is aquatic insects; consequently; if the stream cannot support the aquatic insects, then naturally it cannot support a fish pop-nation,

The aquatic insect population was sampled at stations one, two, three, and four., A large riffle was selected near the station where five samples of two square feet each were taken, A circular frame two square foot sample) covered with window screen (14 meshes per inch.) was used tc collect the insects dislodged from the stream bottom (Figure 18-19), The samples were piaced in glass vials and preserved for analysis at a later date, The number of insects by order was then determined for each sample.

The bottom sampling data shows a trend that resembles that of the fish population sampling (Table 3). Station one had an average of 47,4 aquatic insects per sample, station two had 24 insects per sample, station three had no aquatic insects in any of the samples, and station four had a trace, or 1.4 insects per sample.

in. each case the midges (Dipterans) were the most. numerous, The caddis flies (Tri epterans) were second in abundance at station one, mayflies Epheme-c:tena^,s, at stat._o.. two, and beetles (Coleopterans) at station four.

Table 3, The mean number of aquatic insects per bottom sample (two square feet) for five samples taken at each sampling station on Panther Creek..

Insect Orders	Sampling Stations 1	2	3	4
Stoneflies (Plecoptera)	2.0	3.8	-	-
Mayflies (Ephemeropters)	3.0	6.6	-	-
Caddis flies (Diptera)	26.8	10.0	-	0.6
Beetles (Coleoptera)	-	-	-	0.4
Bugs (Hemiptera)	0.5	-	-	-
Unidentified	-	-	-	0.4
Total	47.4	24.0	0	1.4

Figure 18. A circular frame covered with window screen was used to collect. the aquatic insects from the stream bottom.

Figure 19. The insects were washed from the collecting frame and preserved in a vial for later enumeration,

CUTTHROAT EGG EXPERIMENT

Eyed cutthroat eggs from Henrys Lake were used to measure the effect of siltation coming from Blackbird Creek. These eggs were divided into four lots of 100 eggs each, then placed in nylon mesh bags measuring 5 by 10 inches in size. Mesh size was 14 per inch. The bags were filled with gravel, sewn closed, and buried at six inches depth in a riffle area near the respective sampling station.

The water was dropping in the stream so eggs were left for only seven days before being dug up. Upon examination, 8 percent were found dead at station one, 15 percent dead at station 2, 37 percent dead at station 3, and 7 percent dead at station 4.

LIVE BOX TESTS

Three inch long rainbow trout fingerlings were hauled from Mackay Hatchery to Panther Creek to use for live box tests. Fifty of these fish were placed in each of two live boxes that were 1.5 by 2 by 3 feet in length (Figure 20). These live boxes were
covered by 1/4 inch mesh hardware cloth and three sides of the boxes were boarded up to prevent the fish from being exposed to excessive water velocities in the stream. The two live boxes were placed in at least one foot of water and secured to the bank with one live box located in Panther creek some 300 yards above the mouth of Blackbird Creek about (station 2) and the other live box located in Panther Creek about 1G0 yards below the mouth of Blackbird Creek (station 3).

After being in the stream for three days, the boxes were checked. Station 2 live box contained two dead fish out of 50 and station 3 live box (just below the mouth of Blackbird Creek) contained all dead fish.

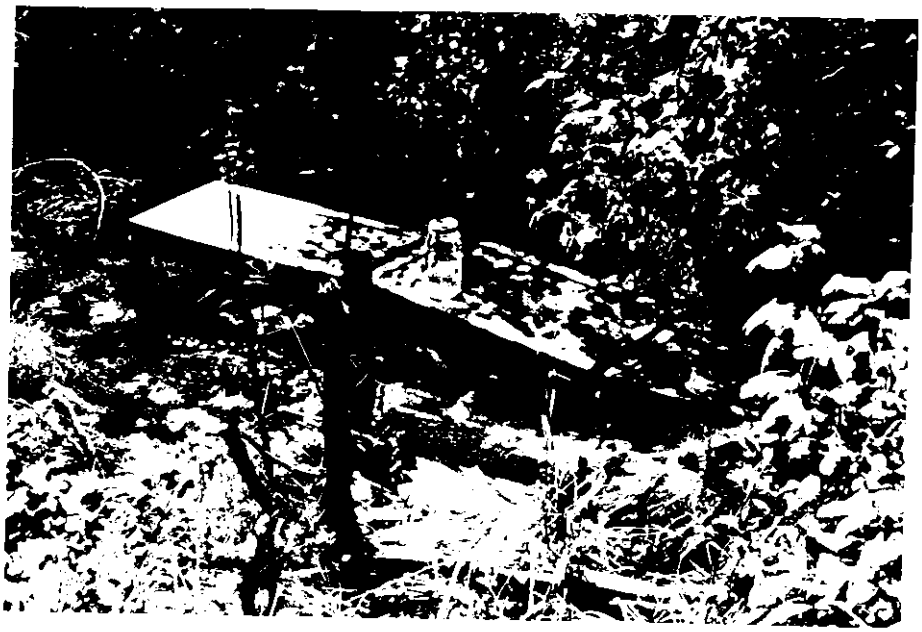

Figure 20.. live boxes were used to hold the rainbow fingerlings in Panther Creek. Each live box contained 50 hatchery rainbow fingerlings,